SECTION 2.0 METHODS AND FINDINGS

SECTION 2.1 SUBWATERSHED DELINEATIONS

The Bush River watershed was delineated into subwatershed management units that range in area from between 2 and 13 square miles. Where feasible, the delineations were developed to align with distinct land uses (i.e., rural/agricultural vs. urban/suburban) and geologic provinces (i.e., Piedmont vs. Coastal Plain) so that unique conditions and management approaches could be more easily separated and distinguished across subwatersheds.

Several factors were evaluated during the delineation process, including:

- Existing Harford County DPW delineations
- Land use (goal to delineate based on largely homogeneous land uses)
- Break between Piedmont and Coastal Plain geology
- Area (goal to have a minimum drainage area of 2 square miles and a largest to smallest drainage area to ratio of about 5:1)
- Known field assessment data points (Conservation Corps and MBSS)
- Scope and budget (goal to keep total number between 20 and 30 based on resources allocated to mapping and analysis tasks)

These guidelines generally worked well when applied across the Bush River watershed. The one exception is Winters Run, where the shape of the watershed and its tributaries along with the distribution of land use presented some challenges. Detail on the delineations and key decision points are provided below. Table 3 presents the delineations based on major watershed, unique identifier, and drainage area. Map 3 is a map of the delineation.

Watershed by Watershed Delineation

A subwatershed numbering and naming convention was developed for this management plan to ensure consistent and unique naming and referencing. While some subwatersheds have identifying names (e.g., Bear Cabin), there are others that do not or may be associated with a different drainage area by local residents. Therefore, alphanumeric identifiers were assigned to ensure consistent definition of the subwatershed areas. The naming and numbering convention for the subwatersheds is based on the major watershed initials and a number assigned in a general clockwise manner. For example, Otter Point Creek Direct Drainage would be assigned the ID of OP-1.

It is of note that there are several subwatersheds that are direct drainages to the mainstem of a larger watershed. This is largely a function of the delineation guidelines that were applied and the unique characteristics of the watersheds. These direct drainage areas, however, are assessed in the same manner as the other subwatersheds.

Otter Point Creek

As previously mentioned, Winters Run (the major tributary of Otter Point Creek) presented the most challenge in terms of delineation decisions. Specifically, due to the long and narrow shape of the watershed, there are several small (i.e., < 2 square miles) subwatersheds that drain to the mainstem of Winters Run. As a result, it was decided to consolidate many of these

subwatersheds into direct drainage delineations. In all cases, these subwatersheds were less than 2 square miles and in most cases they exhibited similar land use as the direct drainage. Lastly, some of these smaller subwatersheds had few if any field data points associated with them, making assessments more uncertain.

Another area that required discussion involved three small, unnamed tributaries on the northeast side of the lower Winters Run mainstem that are much more urbanized than those on the southwest. These subwatersheds were consolidated in to direct drainage delineations, however, their potential to contribute urban influences has been noted in the assessment.

Bush Creek
The Bush Creek watershed is comprised of four Bynum Run subwatersheds, a James Run subwatershed (James Run and Broad Run are combined due to similar land use), and Bush River direct drainage (for analysis simplification purposes, a small drainage area of Bush Creek was lumped with direct drainage to the Bush River on the north side of Bush River as well as Deep Spring Branch drainage on the south side of Bush River). The middle and lower Bynum Run delineations are essentially direct drainages to the mainstem; however, since they contain largely urban land use, this was viewed to be more straightforward than the Winters Run scenario.

Church Creek
The Church Creek delineation is comprised of Grays Run, Cranberry Run, and Church Creek direct drainage. Grays Run is predominantly outside of the development envelope and is largely rural in nature; however, Cranberry Run contains portions of Aberdeen and the Church Creek direct drainage is traversed by major transportation corridors. So there are various urban influences to be aware of in these latter two subwatersheds.

Aberdeen Proving Grounds (APG)
Drainage from APG lands generally are not being considered in this analysis, as the assumption is that these federal lands are not subject to management plan development and implementation.

Table 3. Bush River Subwatersheds

Watershed	Subwatershed Name	Subwatershed ID	Subwatershed Area (sq mi)
Otter Point	Otter Point DD	OP-1	5.09
Otter Point	Lower Winters DD	OP-2	8.04
Otter Point	Mountain Branch	OP-3	2.36
Otter Point	Middle Winters DD	OP-4	6.19
Otter Point	Upper Winters DD	OP-5	12.95
Otter Point	West Branch	OP-6	9.55
Otter Point	East Branch	OP-7	10.21
Otter Point	Bear Cabin	OP-8	3.45
Otter Point	Plumtree Run	OP-9	2.92
Otter Point	Haha Branch	OP-10	2.50
Otter Point		**Subtotal**	63.27
Bush Creek	Bush Creek DD	BC-1	3.98
Bush Creek	Lower Bynum	BC-2	2.48
Bush Creek	Middle Bynum	BC-3	8.44
Bush Creek	Upper Bynum	BC-4	8.64
Bush Creek	James Run	BC-5	11.33
Bush Creek	Little East Bynum	BC-6	3.54
Bush Creek		**Subtotal**	38.40
Church Creek	Church DD	CC-1	3.09
Church Creek	Grays Run	CC-2	6.06
Church Creek	Cranberry Run	CC-3	6.08
Church Creek		**Subtotal**	15.22
		Total	**116.89**

Notes:

DD - direct drainage

See Map 3for locations

Map 3 - Bush River Subwatershed Delineations

SECTION 2.2 CURRENT IMPERVIOUS COVER ANALYSIS

Current impervious cover was estimated from 2000 Maryland Department of Planning land use. Impervious cover was calculated using the land use method. The land use method involves calculating the total area of each current land use then multiplying it by an impervious cover coefficient (ICC). The ICC requires that the built area of each land use be multiplied by a unique ICC to yield a provisional estimate of impervious cover for each land use. The land use classifications and their associated ICC are outlined in Table 4.

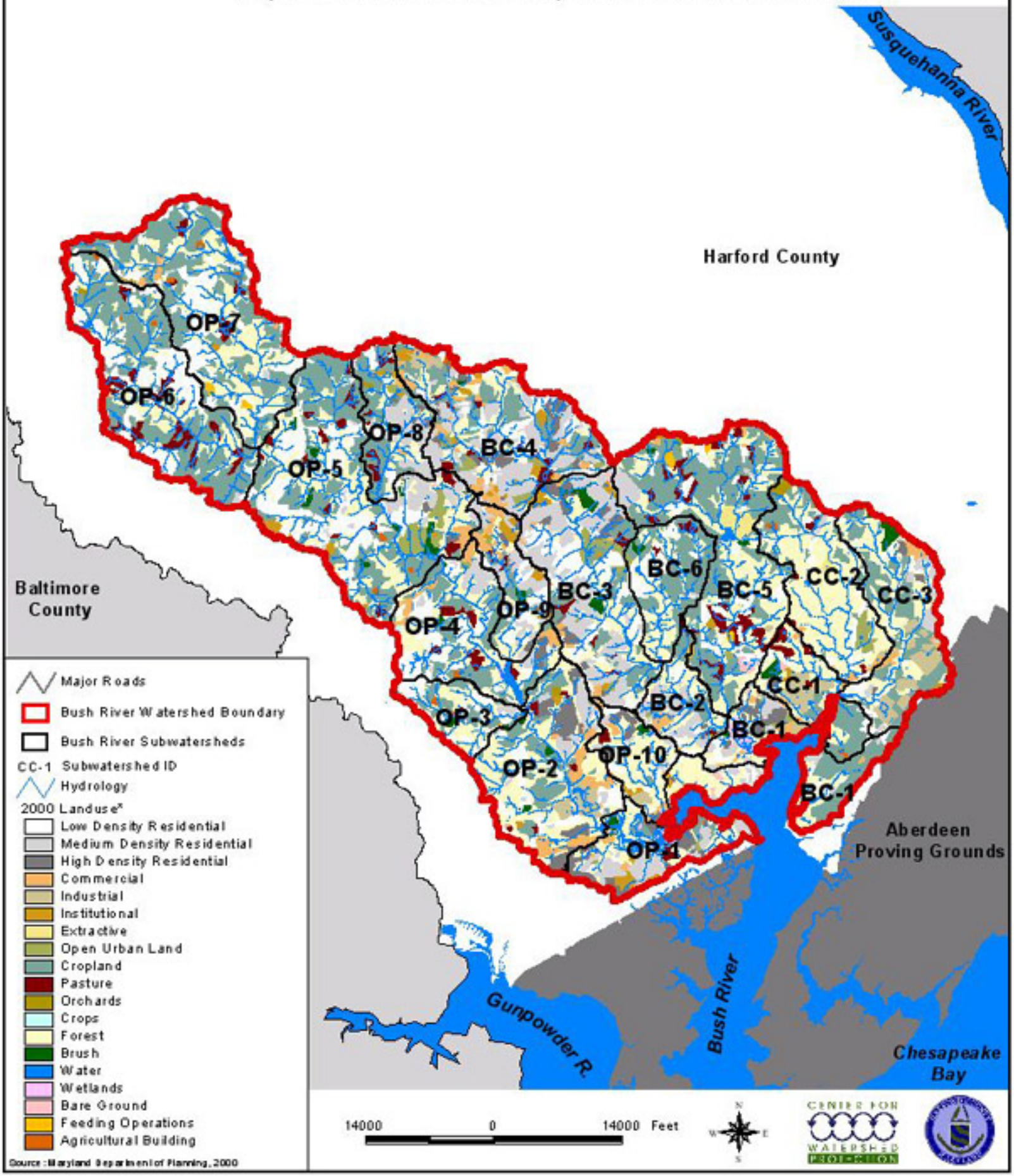
Table 4. Harford County Land Use and Assigned Impervious Cover % (modified from Brown and Cappiella, 2001)

Land Use Code*	Land Use Description	% Impervious
11	Low Density Residential	14.3
12	Medium Density Residential	27.8
13	High Density Residential	40.9
14	Commercial	72.2
15	Industrial	53.4
16	Institutional	34.4
17	Extractive	1.9
18	Open Urban Land	8.6
191	Rural Residential	3.5
192	Rural Residential	3.5
21	Cropland	1.9
22	Pasture	1.9
23	Orchards	1.9
24	Feeding Op	1.9
242	Ag Building	1.9
25	Crops	1.9
41	Forest/Brush	0
42	Forest/Brush	0
43	Forest/Brush	0
44	Forest/Brush	0
50	Water	1.9
60	Wetlands	0
71	Beaches	0
72	Bare Rock	8.6
73	Bare Ground	8.6

*Land Use/Land Cover Data Source: MDP, 2000
For additional details on the Land Use/Land Cover Codes, see Appendix A

A graphical representation of the current impervious cover in Bush River watershed is presented in Map 4. For current impervious cover, subwatersheds were designated as sensitive (<10% impervious cover), impacted (10-25% impervious cover), or non-supporting. Based on impervious cover, seven subwatersheds are classified as Sensitive and 12 fall into the Impacted classification. All of the Impacted subwatersheds have a significant portion, if not all, of their area within the development envelope. Two subwatersheds, Grays Run (CC-2) and Upper Winter DD (OP-5) are projected to shift from Sensitive to Impacted. The remaining ten subwatersheds maintain the same management classification. The results of the calculations are presented in Table 6 and Map 5.

Map 4 - Bush River Current Impervious Cover Baseline Data



Map 5 - Bush River Current Impervious Cover Results